DOCKET FILE COPY ORIGINAL

TEMPO SATELLITE, INC.

8085 South Chester Street, Suite 300
Englewood, Colorado 80112

Via Hand Delivery

Magalie Roman Salas, Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554

Re: Northpoint Technology
Petition for Rule Making
RM No. 9245

Dear Ms. Salas:

On behalf of Tempo Satellite, Inc., there are submitted herewith five copies of Tempo's Comments regarding the above-referenced Petition for Rule Making, prepared by Gary B. McCue. These comments are submitted in facsimile form. The original signature page will be submitted shortly.

Should there be any questions regarding the attached materials, please contact the undersigned.

Very truly yours,

Pamela J. Strauss/RLG

Pamela J. Strauss, Esq.

Corporate Counsel

PS/RLG
encl.

Technical Comments of Gary B. McCue to the 'PETITION FOR RULE MAKING' by Northpoint Technology RM# 9245

1. I am Director of Satellite Services for TCI Technology Ventures, Inc. which provides technical management services for the Tempo Satellite, Inc. System (Tempo). Tempo is a licensee of channels 22-32 inclusive in the BSS band at the nominal 119° WL orbit for DBS service. The Tempo 2 satellite, launched March 8, 1997, is currently located at 118.8° WL.

2. I have reviewed the Petition for Rule Making (Petition) in the matter of Northpoint Technology (Northpoint) regarding their request to modify part 101.147 (p) of the CFR 47 rules. This would provide for use of the 12.2-12.7 GHz band for terrestrial fixed microwave. Section 101.147 (p), however, allocates the band 12.2-12.7 GHz for the Broadcasting Satellite Service (BSS) for Space-to-Earth. Northpoint states it can provide terrestrial services without interference to existing services[1]. Consequently, I have reviewed supporting material from Northpoint's affiliate Diversified Communications Engineering, Inc. (Diversified) and Delawder Communications, Inc. (Delawder).

a) Diversified has applied for modification of an experimental license in Austin, Texas. This apparently provides a vehicle for evaluating their system in the urban environment. This application is for a transmitter of 30 dBm power.

b) An Engineering Report by Delawder (Engr. Report), stated to support the Austin experimental station, presents data and conclusions using a 5 dBm transmitter, with an EIRP of -17.5 dBW.

c) Diversified did experimental tests near Kingsville, Texas to evaluate interference into DBS services. A progress report was filed January 8, 1998 by Diversified on this experimental transmitter (Progress Report). This station has a transmitter of 30 dBm and a series of tests were done regarding C/I ratio at levels from 5 to 29 dBm.

d) Diversified and Delawder refer to a report by DirecTV dated April 11, 1994. This examines terrestrial interference in the DBS downlink band from terrestrial microwave transmitters (TI DBS Report). This report is based on equipment and parameters consistent with DirecTV's DBS services and actual interfering terrestrial transmitters.

3. Tempo objects to initiation of a rule making for terrestrial use of the BSS downlink band, in regards to Northpoint's Petition, for several important reasons:

---

[1] page 2 'without interference to existing services'

a) Northpoint has not fully defined the design, characteristics, performance, and extent of it's proposed system. Therefore, there is no reasonable basis for a rule making. Northpoint has not fully defined:

i) The number of stations in the continental US including Alaska, Hawaii and Puerto Rico, areas served, construction costs for transmitting stations and subscriber terminals, financial information, etc.

ii) The transmitting station antenna height, gain and pattern, it's transmitter powers, service contours, building and structure, number of channels, it's polarization, it's frequency plan, modulation, bandwidth, etc.

iii) The subscriber terminal antenna height, gain, and pattern, orientation, availability and reliability of the terminal, how the subscriber switches the different L band signal, LNB power differences, etc.

iiii) The interference into DBS operations for all locations in the continental US, Alaska, Hawaii and Puerto Rico, for all US licensed orbits, the availability of it's service, reliability of it's equipment, it's compliance to ITU regulations under Orb 85/88 including Appendix 30/30A, it's signal quality delivered, etc.

b) The interference potential has been under estimated by Northpoint. The interference potential of a US deployed system must be evaluated, but Northpoint's system is not defined. Therefore, a brief evaluation of a hypothetical system was outlined herein. In the hypothetical system, a transmitter power of 23.4 dBm with 30 cm antennas provides availability of 99.8% in the E rain Zone, see section 4. At this 23.4 dBm transmitter level, however, using a 19 dB C/I from DirecTV's TI DBS Report, DBS subscribers would have reduction of availability 20% a distance of 14.7 miles, see section 5. At a lower power of 5 dBm, the range of the hypothetical system would only be 3.25 miles, see section 4. At a 5 dBm transmitter level a 20% reduction of DBS subscriber availability would extend 1.77 miles, see section 5.

c) The DirecTV's TI DBS Report shows a C/I of 19 dB will reduce availability 20% on DBS subscribers. A 20% reduction in availability is unacceptable to Tempo. A C/I ratio higher than 19 dB is needed, because 20% reduction in availability is unacceptable for Tempo's services. Northpoint claimed a C/I ratio of 4.8 to 6.0 dB in it's Engr. and Progress Reports.

d) Northpoint claims a range up to 10 miles for it's service, see the Diversified Progress report. It may not be practical to provide comparable service coverage to that of DBS satellites. Northpoint would need 23 thousand transmitting stations of 157 square miles each, to cover the United States, an area of 3.6 million square miles.

e) The complexity and costs of the digital video encoding equipment, compatible to the DBS operators, at thousands of stations, would be so expensive as to be impractical. The terrestrial transmitter would have to

carry at least four different sets of digitally compressed signals, if each of the licensed DBS operators signals were carried as claimed by Northpoint.

4. A hypothetical Northpoint terrestrial system design was done, because limited material on the design of Northpoint's system was contained in the Petition, the Progress Report and Engr. Report:

a) The Engr. Report specifies the station at Austin, Tx will use 5 dBm power with EIRP of -17.5 dBW. Therefore, the hypothetical system will consider 5 dBm and gain of +10 dBi, with 2.5 dB line loss, with power increased or the antenna size increased if needed.

b) The Petition states it will reuse the DBS band as another slot, implying all 32 DBS channels will be used. However, if the range of the service is 10 miles, then overshoot from adjacent Northpoint stations could cause self-interference. This analysis will assume horizontal and linear polarization in the band 12.2-12.7 GHz, with overshoot of 21 dB used in the calculation.

c) The receive antenna, mounted on the subscribers roof to help clear trees and other obstructions, would need to be as small as possible. A 30 cm offset reflector (12 inches) is used, with a gain of 30.5 dBi at 70% efficiency. Cross-polarization isolation, adjacent channel isolation, atmospheric absorption, mispointing and squint losses are shown below. The transmit pattern is based on the diagram in the Delawder report, with a gain of +10 dBi at azimuth of 180 degrees.

d) Northpoint states that it will reduce it's own signal in the presence of rain. This is not practical, since Northpoint's subscribers must have the same availability as DBS, if the service is offered with DBS. An allowance for rain fading is added at availability of 99.8% for E rain zone, an amount of 21 mm/hour and attenuation of 0.8 dB/km for horizontal polarization. This is an outage of 1,052 minutes/year. The E rain zone includes part of Eastern Texas, part of Arkansas, Louisana, most of Alabama, Mississippi, part of Georgia, all of Florida, part of S. Carolina, part of N. Carolina.

e) Calculations for the hypothetical system:

Azimuth, degrees true	135	180
Transmitter power, dBm	+5.0	+5.0
-waveguide loss, dB	-2.5	-2.5
+antenna gain, dBi	+8	+10
-conversion to dBW	-30	-30
=EIRP of Station, dBW	-19.5	-17.5
-path loss to Receiver, 10 miles	-138.5	-138.5
-k, Boltzmann's Constant, dB/k-Hz	+228.6	+228.6

+gain receive antenna, 30 cm	+30.5	+30.5
-noise temperature, dB-k[2]	-25.7	-25.7
-atmospheric absorb., dB	-0.3	-0.3
-mispointing and squint., dB	-0.5	-0.5
-noise bandwidth, dB-Hz[3]	-73.8	-73.8
=Thermal C/N, dB, clear sky	+0.8	+2.8
-losses due to rain, 21 mm/hr[4]	-12.8	-12.8
=Thermal C/N, dB, in rain	-12.0	-10.0
addit. antenna gain or power req'd for 8.4 dB thermal C/N, dB	20.4	18.4
1) Req'd antenna size for 8.4 dB C/N faded w/ 5 dBm Tx for 99.8% availability[5]	3.14m	2.5m

(Antennas of 2-3m size are not practical, so power must be increased)

2) Req'd power, dBm, 99.8% avail. for 10 mile path length 30 cm[6]	25.4	23.4
thermal C/N faded, dB	8.4	8.4
cross-polarization, dB	25.0	25.0
adjacent channel, dB	25.0	25.0
overshoot C/I, dB	21.0	21.0
=Combined faded C/N, dB	8.0	8.0[7]

f) Conclusions regarding these calculations, are that it is unrealistic to operate a service at 5 dBm transmitter power. A power level of 23-25 dBm is needed with 30 cm antennas, or the service will only operate a much shorter distance, as shown below:

Azimuth, degrees true 180

---

[2] based on antenna noise 290 k, LNB 67 k and misc 20 k = 377, in dB-k 10 log 377 = 25.76 dB

[3] based on 24 MHz as used in TI DBS Report from DirecTV

[4] Path of 10 miles = 16 km at .8 dB/km = 12.8 dB loss at 21 mm/hr rain for 99.8% rain zone E

[5] if the transmitter remains +5 dBm, this size antenna is required for the availability 99.8%/year for the E rain Zone for the 10 mile path

[6] if the transmitter is increased to these levels, the availability of 99.8% can be met using the 30 cm antenna.

[7] DirecTV states a threshold for it's system is 8.0 dB system C/N and Northpoint states it will use identical design with the DBS services.

=EIRP of Station, dBW	-17.5
-path loss to Receiver, 3.25 miles	-128.7
-k, Boltzmann's Constant, dB/k-Hz	+228.6
+gain receive antenna, 30 cm	+30.5
-noise temperature, dB-k[8]	-25.7
-atmospheric absorb., dB	-0.3
-mispointing and squint., dB	-0.5
-noise bandwidth, dB-Hz[9]	-73.8
=Thermal C/N, dB, clear sky	+12.6
-losses due to rain, at 21 mm/hr[10]	-4.2
thermal C/N faded, dB	8.4
cross-polarization, dB	25.0
adjacent channel, dB	25.0
overshoot C/I, dB	21.0
=Combined faded C/N, dB	8.0[11]

5. An analysis of interference into DBS systems, on the basis of the distance within which it occurs can be based on the material introduced already:

a) The potential of interference has been under estimated in the Progress and Engr. Report, based on the C/I ratio of 4.8-6.0 dB that was used. Tempo believes the TI DBS Report by Direct TV, which specified a C/I ratio of 19 dB, causing a reduction of 20% availability in subscriber systems, is more accurate.

i) A calculation using the data from the Delawder report indicating DBS systems are affected inside 2100' of the 5 dBm transmitter with 6.0 dB C/I, can be compared to the 19 dB C/I level of the TI DBS Report.

ii) Comparing the DirecTV level of 19 dB C/I to the Delawder 6.0 dB C/I, the interference is understated in distance. The difference in C/I ratio is 19 dB -6.0 dB = 13 dB. The increased distance, a factor of path loss, is 20 log (D1/D2) with D1 being the further location, and D2 being the closer, in miles.

iii) Starting path length 2100'/5280' = 0.397 miles. In distance, the increase is log-1 of (13/20) = 4.46 x 0.397 miles = 1.77 miles.

---

[8] based on antenna noise 290 k, LNB 67 k and misc. 20 k = 377, in dB-k 10 log 377 = 25.76 dB

[9] based on 24 MHz as used in TI DBS Report from DirecTV

[10] Path of 10 miles = 16 km at .8 dB/km = 12.8 dB loss at 21 mm/hr rain for 99.8% rain zone E

[11] DirecTV states a threshold for it's system is 8.0 dB system C/N and Northpoint states it will use identical design with the DBS services.

b) The interference potential is also understated, since the power needed to obtain a range of 10 miles in the Northpoint hypothetical system, is a transmitter level of 23.4 dBm, an 18.4 dB increase. This increase adds in the same manner to the 1.77 mile distance already calculated. Therefore, the new distance calculation log-1 (18.4/20) = 8.3 x 1.77 miles = new distance of 14.7 miles. At the 23.4 dBm power level, the interference or exclusion zone in which DBS can't be used is larger than the service area of Northpoint, using a small 30 cm antenna, in the E rain Zone, for availability of 99.8%.

c) In addition, Tempo believes even a 20% reduction in subscriber availability is unacceptable, a C/I level higher than 19 dB may be required to reduce outage to DBS subscribers.

By _____ Date 4/20/98
Gary B. McCue
Director, Satellite Services

CERTIFICATE OF SERVICE

I, Pamela J. Strauss, do hereby certify that this 20th day of April, 1998, I have caused the foregoing "Comments" to be delivered via first class mail, postage prepaid, to the following:

Richard E. Wiley, Esq.
Wiley Rein & Fielding
1776 K Street, N.W.
Washington, D.C. 20006

Counsel for Northpoint Technology

Pamela Strauss